Arthritis

The Use of Physical Therapy as an Aspect of Management

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• **In some cases arthritis can be controlled even in the acute stage by physical therapy alone. In many cases, recovery depends on how thoroughly and intelligently such methods are applied.**

Heat, ultrasound and therapeutic baths relieve pain and spasm, permitting greater freedom in passive and active exercise. Exercise is necessary in maintaining and restoring function to arthritic limbs. Because the atrophy produced by rheumatoid arthritis is greater than that due to mere disuse for the same length of time, resistive exercise is especially valuable in building muscle, and this can be carried out even during active inflammation. Without exercise the muscles weaken and throw a greater burden on the already disabled joints.

At the same time the patient must be relieved of undue stress and trauma by planned rest, splinting, bed posture and, later, crutches and other aids to ambulation. Efforts should be made to prevent contractures and deformities.

Occupational therapy increases muscle strength, range of motion, work tolerance and mental status. A dynamic and carefully planned rehabilitation program hastens restoration of the patient's independence and usefulness.

DURING THE YEARS in which cortisone, gold and salicylates have established their value and their limitations—in the treatment of arthritis, progress has been made too in the methods of physical medicine, although often such methods have been neglected by physicians. The author has observed cases in which the steroids were used to control the inflammation while the other effects of disease—contractures, muscular atrophy, deformity, osteoporosis and the ability of the patient to carry out the activities of daily living—were ignored. The opposite emphasis, indeed, is necessary: In a large number of cases the inflammatory stage can be adequately controlled by physical measures such as heat, hydrotherapy, ultrasound, exercise, avoidance of trauma, and carefully planned rest, all of which can also aid recovery.

Obviously, joint tuberculosis and malignant disease must be ruled out before physical therapy is considered. Thickening of the synovium, for example, may be due to sarcoma.

Heat Therapy

Heat relieves spasm and pain, dilates vessels, increases circulation, improves tissue metabolism and hastens the absorption of exudates. Heat may be applied locally or generally. It should not be applied to a limb with arterial insufficiency where the resulting increase in tissue metabolism may not be compensated by sufficient vasodilatation and hyperemia, for gangrene may result.

Heat from electric lamps—luminous heat—is useful for all stages of rheumatoid and osteo-arthritis. In the clinic a 1,000-watt tungsten-filament light bulb is used, but for home use a 250-watt bulb with reflector is adequate, or a luminous baker can be built of sheet metal with a scrap-iron frame and four 60-watt bulbs.

The paraffin bath at 130° F. is used in the treatment of hands and elbows, but is objectionable for treatment of the feet because it quickly develops an odor from perspiration. The affected area is momentarily dipped in the paraffin, which is then allowed to harden. This is repeated until a thick coat has collected; then the area is allowed to remain in the bath or is covered with towels for 30 minutes to retain the heat. The exposed skin must not be left in the bath as the coated area is, or it will burn. Moving a coated joint breaks the coating. For home use four pounds of paraffin (usually 16 blocks in the commercial form) is mixed with a cup of mineral oil, and this solution may be used repeatedly. It is highly inflammable and must be kept from open flame.

Short-wave and microwave diathermy is not advisable in the treatment of acutely inflamed joints because it often aggravates pain.

Another method of applying heat is with moist packs containing a colloidal gel filter which has absorbed water during storage in a thermostatically controlled tank. Such packs supply at least 30 minutes of effective moist heat.

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Ultrasound Therapy

Ultrasound helps to decrease arthritic pain, muscle spasm, joint swelling and inflammation.[6] It is also used after intra-articular injection of steroids to aid dispersion. An application of one-half watt to one watt per square centimeter from a moving source has produced no cumulative or harmful effect.[5]

Roentgen Therapy

Neither heat nor ultrasound should be applied concurrently with roentgen therapy, as their use makes it difficult to determine which of these methods is the cause of any redness or vasodilatation that may result. Ultraviolet therapy has been used to relieve psoriatic arthritis skin lesions. Roentgen therapy may decrease pain and inflammation in rheumatoid spondylitis, and during such relief the patient is given intensive breathing and postural exercise. Irradiation should not be considered, though, before a patient has had adequate trial of ultrasound and luminous heat. Ultrasound has been credited with relief comparable and in some cases superior to that of roentgen therapy.[6] If arthritis is due to lupus erythematosus, exposure to sunlight or to any light in the ultraviolet spectrum may cause acute exacerbation of the underlying disease.

Baths

Thermal baths, covering the patient to the shoulders, are given at a temperature of 100° to 103° F. for 10 minutes. At the higher temperature, in the author's experience, the patient's oral temperature was raised on the average by 3° F. and in some cases of peripheral rheumatoid arthritis to 105° F.

Besides this effect, thermal baths produce vasodilatation, increase the cardiac rate, the metabolic rate and the peripheral circulation, promote diaphoresis, absorption of exudates and diuresis and relieve muscular spasm and pain. After a bath the patient should be wrapped in blankets and allowed to cool gradually for 30 minutes. He should be warned not to take a hot bath at home immediately before retiring for the night, because the bedding will become soaked with sweat.

Thermal baths are contraindicated in tuberculosis, heart disease, dyspnea, pregnancy, menstruation, aneurysm, hypertension, hemorrhagic disease, moderate or severe peripheral vascular disease, dermatophytosis and blood chloride deficiency (heat prostration).

Whirlpool baths permit the application of even warmer water to the extremities, as the massaging action of the whirling water produces a relative surface anesthesia. Debilitated patients may tolerate no more than a 105°F. temperature, but usually 110° is acceptable. The combination of heat, anesthesia and buoyancy releases pain and spasm and thereby increases the range of motion of the immersed joints and permits exercise.

The therapeutic pool is especially useful for exercise, with the buoyancy of the water acting as either an assistive or a resistive force. The buoyancy may aid in early ambulation. Passive exercise can be given while the patient lies on a table in the pool, with the warm water reducing pain and spasm. Patients should not share a pool if they have respiratory infection, fever, acute infectious disease, draining wounds or skin infection, or if menstruating or incontinent.

The Hubbard tank, with water at 100°F., is frequently used for patients with inflammation of several joints. The agitators can be moved about to the affected joints while exercise is carried out. Patients who cannot walk can be lifted into a pool or a Hubbard tank on a stretcher attached to an overhead crane.

When a patient with an open wound or draining infection is treated by any kind of bath, an antibacterial emulsion (pHisoHex®) is added to the water.

Contrast baths are given by immersing an extremity at 100°F. for 10 minutes and then at 60° for one minute, then in the hot water for four minutes and the cold for one minute alternately for a half hour. In rheumatoid arthritis, it has been observed, vasoconstriction due to cooling is more pronounced and prolonged. According to Fricke and Gersten[2] the majority of their patients with rheumatoid arthritis received no remarkable relief from contrast baths. This treatment should be used with caution in patients who have any tendency toward peripheral vascular disease, since it may cause prolonged spasm of the peripheral vessels unrelieved by the ensuing application of heat and possibly result in thrombosis.

Another measure, sometimes used to relieve pain and muscular spasm, is ethyl chloride spray.

Exercise

Therapeutic exercises should be continued throughout the patient's life. They begin with passive exercise in which the muscles should be completely relaxed while the therapist moves the part through the indicated range of motion, not only to maintain but to increase this range and prevent ankylosis and contracture. The exercise may vary from a few repetitions in a limited range to strong stretching of contractures, but the extent must be definitely prescribed. Forceful manipulation of the wrists and fingers may induce intra-articular hemorrhage, adhesion, and subsequent shrinking of the capsule. Gentle stretching more efficiently corrects deformity or contracture, although manipulation may be indicated for the larger joints. As mentioned

above, heat is applied to reduce pain and bring about relaxation and vasodilatation before any form of exercise.

Isometric muscle-setting exercise is the voluntary contraction and relaxation of muscles without joint motion. It may be carried out while the part is in a cast or splint.

In assistive exercise the patient moves the part through the full range of motion with the therapist assisting, perhaps only to initiate the motion or to carry it beyond the voluntary range. The patient may assist himself with an uninvolved limb or through pulleys and other mechanical devices such as the shoulder wheel and the finger stepladder. Weight and friction may be overcome by such devices as roller skates and powdered surfaces.

Because the atrophy brought about by rheumatoid arthritis is greater than that caused by mere disuse for the same length of time, resistive exercise is important in building muscle. Repetitive exercise against low resistance increases endurance, but fewer repetitions against maximum resistance builds muscle strength, power, girth and bulk. This difference is due to the "all or none" principle that the individual muscle fiber either contracts maximally or does not contract at all. The greater the resistance against a muscle bundle, the greater the number of fibers that take part in the contraction. A few repetitions against maximum resistance allow the patient to contract all muscle fibers before fatigue develops. Resistance can be applied by the therapist or by sandbags, bar bells or dumbbells. The Elgin exercise table provides pulleys and weights for either assistance or resistance through all ranges of motion.

Active joint inflammation does not contraindicate resistive exercise; on the contrary, strengthening surrounding skeletal muscles has both a prophylactic and a therapeutic effect, for strong muscles help to support the inflamed joint, whereas weak muscles throw the burden on soft tissues such as the capsule, the ligaments and the articular surfaces.

For resistive exercises, the amount of weight applied and the goniometric readings should be recorded. Flexion and extension of the joint should be slow and complete at each effort. Resistive exercise of uninvolved areas keeps them in condition to aid rehabilitation.

A special exercise is needed for the vastus medialis, which carries the knee through the last 10 degrees of extension and locks it. When the knee is extended by a swinging motion the momentum completes the extension without the vastus medialis contracting. This muscle benefits from static loading exercise in which the leg is held horizontally extended from the knee while weights are added to the ankle.

Exercise aids in dispersal of injected steroids throughout a joint and adjacent surfaces.

Rest

A patient with rheumatoid arthritis should have scheduled rest periods during the day as well as sufficient sleep at night, but absolute bed rest without any exercise or motion is harmful. All efforts should be made to encourage him to keep his joints moving. If the patient will not or cannot carry out active or assistive exercise he should be passively exercised through the full range of motion. Even in the presence of severe inflammation or debilitation, assistive and, usually, active exercise can be carried out if the patient is properly motivated.

Absolute bed rest would be prescribed with much hesitancy if its adverse effects were considered: loss of protein, minerals and vitamins; muscle weakness and atrophy, contracture, osteoporosis and reduction of postural steadiness. Osteoporosis can cause hypercalciuria, while the recumbent position reduces urinary drainage and may contribute to formation of urinary calculi. After prolonged bed rest, great caution must be used in resuming ambulation, because of the abnormal bone fragility.

Elimination of Trauma

Trauma in arthritis can be caused by overweight, by weight-bearing on unstable or flexed joints, by poorly fitted shoes, by poor posture, by occupational stress and even by psychic stress.

Patients with rheumatoid arthritis often lie in bed with knees and elbows in flexion, and contractures quickly result. Sometimes this effect is promoted by the placing of pillows under the knees, or by raising the hospital bed at this point. The contrary effect should be sought, the patient lying flat with a footboard and cradle supporting the blankets to prevent footdrop, and with pillows or sandbags placed along the lateral aspect of the lower extremities to prevent external rotation of the hip. The arms should be kept semi-abducted with the elbows and wrists straight and small folded towels placed under the palms. For a change of position, lying on the abdomen prevents and corrects flexion deformities of the hips.

Splinting may help to relieve spasm and deformity, but it should be adapted to the degree of deformity present.[3]

Flexion deformities of the knee, knee effusion or weakness of the quadriceps contraindicates full weight-bearing, for ambulation on a flexed knee throws an abnormal postural strain on other joints and on the back. Wheelchair footboards holding the knees extended are indicated in acute knee involvement. Sitting in a chair for long periods causes

flexion deformities of hips and knees. Patients with lower extremity weakness may ambulate in a pool or with the aid of parallel bars, a walker or crutches.

In acute involvement of the feet, full weight-bearing should be limited, for there is a tendency for a rigid valgus equinus to develop, with a flat anterior arch and cocked-up toes, and for the metatarsal phalangeal joints to become deformed by subluxation.

Rheumatoid Spondylitis

Rheumatoid spondylitis causes flattening of the lumbar curve of the spine, limitation of motion, dorsal kyphosis, radiculitis and compensatory extension deformity of the neck. Usually the shoulders become involved, resulting in limitation of motion, and therefore they should be exercised early in the course of the disease before the involvement is manifest. Chest expansion should be recorded early, for it decreases as the ribs slope down anteriorly and tend to become fixed in that position. The patient's height, too, should be measured, as also the distance from his fingers to the floor as he stands with the spine flexed.

Ultrasound and luminous or moist heat relieve radicular and other pain and spasm in rheumatoid spondylitis. The patient should practice intensive breathing and postural exercises. He should sleep on a bed board. Several times a day he should lie on a hospital bed with his head at the foot end and the knee elevator raised under his dorsal region, producing hyperextension of the spine. Pillows placed under the thoracic spine also accomplish hyperextension.

A spondylitic patient should not remain upright for long periods. When he begins to slump he should rest in recumbent hyperextension, even at work, several times a day. A back brace is undesirable for several reasons. The strong extensor muscles of the spine serve as the best "back brace," and if an artificial brace is used the patient tends to neglect his exercises on the excuse that the brace is sufficient. On discarding the brace, he has increased weakness of the back extensors and deformity quickly develops. The extensor muscles of the spine should be intensively exercised, while lumbar lordosis is corrected by straight-leg raising and sitting-up exercises that strengthen the abdominal muscles.

Other Arthritic Diseases

Osteoarthritis, although a degenerative disease, may result from prolonged joint irritation or trauma, which should be eliminated. Overweight, for example, may cause hypertrophic arthritis of the weight-bearing joints—the hips, the knees and the lumbar spine. The pain-relieving and spasm-relieving measures discussed above may be applied. If the cervical spine is involved, mechanical intermittent traction may be used to relieve radiculitis. Mild passive, active and assistive exercises are indicated.

Degenerative disease of the hip, coxae malum senilis, causes softening, osteoporosis and sometimes vascular necrosis of the femoral head. The glutei and thigh extensors become weakened. Forward inclination of the pelvis may cause low backache, and flexion and adduction contractures of the hip develop rapidly. Treatment is centered about decreasing trauma and weight-bearing on the hip. Obesity must be reduced, crutches may be necessary, and the patient may be exercised by ambulation in parallel bars or in water. These active exercises, as well as passive methods, are aimed at maintaining both muscle strength and range of motion. Flexion contracture of the hip may be prevented by having the patient lie on his abdomen and exercising the extensor muscles of the hip. Traction may relieve such deformity and take pressure off the hip joint.

Occupational Therapy

Occupational therapy improves muscle strength, range of motion, work tolerance and mental status through creative and productive activity.

The psychiatric function of occupational therapy is to correct or ameliorate extreme depression, agitation or anxiety, to which the arthritic patient is particularly subject.

Tonic therapy keeps the patient's mind occupied and prevents deconditioning of uninvolved members. The project chosen should be interesting to the patient, providing incentive, and should not be too difficult, for failure to accomplish it leads to discouragement and depression.

Kinetic occupational therapy maintains and increases range of motion and muscular strength of the affected parts. As the patient's condition improves, the therapeutic tasks should be changed to require stronger effort and greater range of motion. The bicycle saw may be given added resistance and the pedals can be moved outward for a greater cycle. On a printing press the patient reaches far above his head to pull the handle down to chest height, and pulleys and weights may be added to resist his effort. The pronounced atrophy and weakness of the intrinsic muscles of the hand, particularly the interossei, are corrected by cord knotting. Working with bouncing clay increases both strength and range of hand motion. Weaving on a loom exercises upper and lower extremities through a wide range of motion.

Metric occupational therapy demonstrates measurably the patient's increase in work tolerance and strength to the level demanded by daily living and

by the patient's occupation. This in itself can provide an incentive for effort as the work load is systematically increased within the tolerance of pain and fatigue.

Occupational therapy can be given initially on the ward, but as soon as possible the patient should be sent to the occupational therapy shop to release him from the confines of his room and allow him to visit with other patients, who encourage each other by their progress and group spirit.

REHABILITATION

The rehabilitation of arthritic patients is important to both the humanitarian and the economic aspects of preventing a great segment of our population from becoming helpless cripples. Rheumatic diseases lead all other diseases and disorders as the greatest cause of workdays lost because of disability—it is estimated, 80 million workdays each year in the United States. Half of the 11,000,000 Americans who have rheumatic disease are partially or totally disabled, incurring an annual loss of over two billion dollars in welfare and disability payments, medical expenses, lost wages and taxes.[1] Another 2.8 million have been forced to change their occupation or lessen their output.[2] The disabled patient may require the services of another member of the household to assist him in self-care, thus decreasing family earning power.

A dynamic rehabilitation program prepares the patient to become a productive wage earner and active member of society. He is trained in the activities of daily living such as toilet needs, dressing, combing his hair, shaving and feeding himself. Capability of self-care allows the remainder of the family to be gainfully employed. The patient lacking motivation is difficult to treat, failing to carry out his treatment program and making little effort to correct his deformities. To insure proper motivation and instill confidence a detailed progressive objective rehabilitation program should be formulated. The therapist should reassure the patient, impart enthusiasm, listen to his problems, gain his confidence, and allow him to ventilate his anxiety, anger and hatred. The residual disability that will persist after the most intensive rehabilitation efforts should be determined. Psychometric and vocational testing determine the patient's innate attributes, manual dexterity, coordination, mental status, intelligence, mechanical or artistic inclinations and specific centers of interest. His basic education, emotional stability and personality are evaluated. The patient's interests, ability, motivation and progress can be observed while he works in the various physical medicine departments. Several occupations which are particularly suited for the patient are determined—those that he has a reasonable chance of succeeding in without physical, emotional and mental strain. When he has made his choice, training is immediately instituted to prepare him for its requirements. Definite progression toward this ultimate goal provides motivation, whereas haphazard palliative treatment lacking direction as to an ultimate realistic goal is demoralizing, frustrating and confusing. The value of each prescribed activity in securing this goal is emphasized to the patient.

Retraining may be carried out by the educational therapy and manual arts therapy sections of a Veterans Administration hospital. The California State Department of Vocational Rehabilitation will aid in supplying both therapy and training for those who can be returned to productive occupations. Volunteer skilled and professional people from the community may teach patients. Many colleges supply practice teachers. The hospital and public libraries can supply textbooks. The patient may obtain a high school diploma during hospitalization, or may take correspondence courses for high school, college or technical vocational training. He may receive treatment and prevocational training in a rehabilitation center and later work in a "sheltered workshop."

Arthritic patients who thrive on attention encourage others to care for them rather than care for themselves. The family should be advised that their waiting upon the patient is detrimental. Utensils and clothes should be placed in locations that force the patient to carry his joints through the fullest range of motion in reaching them. Here, too, though, the patient must not be discouraged by tasks beyond his abilities.

Patients with decided deformities require self-help devices to carry out activities of daily living; these may be improvised in the occupational therapy shop or purchased. The Institute of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center, publishes a descriptive list of commercially manufactured self-help devices and where they may be purchased. For those whose extension contractures of the interphalangeal joints prevent adequate grasping, large balsa-wood handles are attached to tools and utensils such as pencils, combs, knives and forks. As finger flexion increases, the handles are made smaller. Exercise, dexterity and coordination of the hands are obtained while using these modified utensils. Clothing may be fastened with large buttons. Rheumatoid spondylitic persons with stiffness of the back and hips rise from a seat by swinging forward and upward with the entire body. This action is more pronounced when hands and shoulders are involved. For such patients, chairs should be raised, have solid arm rests and stiff back and seat. Toilet seats should be made higher.

Patients with deformities that prevent ambulation can arrange their kitchens so that everything is within their reach.

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REFERENCES

1. Arthritis and Rheumatism Foundation, Southern California Chapter, 1957: Fact sheet.

2. Fricke, J. F., and Gersten, J. W.: Contrast baths in arthritis, Arch. Phys. Med., 33:210, April 1952.

3. Hollander, J. L., in Comroe's Arthritis, 5th Edition: Pages 363-365, 1953.

4. National Health Education Committee, Inc.: Facts on the Major Killing and Crippling Diseases in the United States Today, 1957.

5. Reese, E. P.: The clinical aspects of ultrasound, Internat. Rev. Phys. Med., 2:30, June 1957.

6. Reese, E. P., Kinnison, D. M., and Jacobus, H. J.: Ultrasonics in arthritis, Proceedings Third Annual Conference on Ultrasonic Therapy, American Institute of Ultrasonics in Medicine, p. 65, Sept. 4, 1954.

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